US009074027B2

(12) **United States Patent**
Lucas et al.

(10) **Patent No.: US 9,074,027 B2**
(45) **Date of Patent: *Jul. 7, 2015**

(54) **DIP-FORMED SYNTHETIC POLYISOPRENE LATEX ARTICLES WITH IMPROVED INTRAPARTICLE AND INTERPARTICLE CROSSLINKS**

(71) Applicant: **Ansell Healthcare Products LLC**, Iselin, NJ (US)

(72) Inventors: **David M. Lucas**, Petaling Jaya (MY); **Sugarth Amarasekera**, Kotte (LK); **Dave Narasimhan**, Flemington, NJ (US); **Adeline Ai Lin Kung**, Petaling Jaya (MY)

(73) Assignee: **Ansell Healthcare Products LLC**, Iselin, NJ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 139 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/910,364**

(22) Filed: **Jun. 5, 2013**

(65) **Prior Publication Data**

US 2013/0291873 A1 Nov. 7, 2013

Related U.S. Application Data

(63) Continuation of application No. 13/277,445, filed on Oct. 20, 2011, now Pat. No. 8,464,719, which is a continuation of application No. 12/194,118, filed on Aug. 19, 2008, now Pat. No. 8,087,412.

(60) Provisional application No. 61/049,637, filed on May 1, 2008.

(51) **Int. Cl.**
A61F 6/04 (2006.01)
C08F 136/08 (2006.01)

(Continued)

(52) **U.S. Cl.**
CPC ***C08F 136/08*** (2013.01); *Y10T 428/2982* (2015.01); *A41D 19/0055* (2013.01); ***A61F 6/04*** (2013.01); *B29L 2031/4864* (2013.01); ***C08L 23/20*** (2013.01); ***B32B 27/32*** (2013.01)

(58) **Field of Classification Search**
CPC A61F 6/02; A61F 6/04; A01B 12/006
USPC 128/842, 844; 604/347–356
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,215,649 A 11/1965 Preiss et al.
3,897,405 A 7/1975 Son et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CN 1479754 A 3/2004
CN 1705687 A 12/2005

(Continued)

OTHER PUBLICATIONS

European Patent Office, Office Action, Application No. 09739504.0-1301, dated May 26, 2014, 5 pages.

(Continued)

Primary Examiner — Michael Brown
(74) *Attorney, Agent, or Firm* — Moser Taboada

(57) **ABSTRACT**

A synthetic polyisoprene latex emulsion has pre-vulcanization composition and post vulcanization composition. The pre-vulcanization composition comprises soluble sulfur with high S_8 ring structure that is catalytically broken by a zinc dithiocarbamate. Surfactants present in the pre-vulcanization composition wets synthetic polyisoprene particles and permeates small sized sulfur and accelerator molecules into the interior of these particles thereby pre-vulcanizing the particles. The degree of pre-vulcanization is verified by isopropanol index test. The latex emulsion has post-vulcanization composition with accelerators that crosslink inter-particle region during post vulcanization cure cycle. The dipped synthetic polyisoprene article is substantially uniformly cured both in the inter-particle and intra-particle regions and reliably exhibits high cross link density, uniform distribution of double bonds in TEM and zinc segregation at the boundaries or original particles by electron microprobe analysis. The films exhibit high tensile strength, tensile modulus, tear strength, burst pressure and burst volume.

20 Claims, 7 Drawing Sheets